

Solar activity ranged from low to high levels. The period began at moderate levels with Region 365 (S07, L=182, class/area/mag. Dkc/880/Bgd on 29 May) producing two M-class flares on 26 May. The first, an M1/1f at 0550 UTC, was associated with a Type IV radio sweep. The second, an M1 flare at 1637 UTC, was associated with a slow, faint halo CME as seen in LASCO imagery. Region 365 was in a rapid growth phase from 26 – 29 May and developed multiple delta configurations. On 27 May, Region 365 produced two M-class flares and an X1/2b at 2307 UTC. The X1 was associated with a Tenflare (910 SFU), and Type II (650 km/s) and Type IV radio sweeps. High activity levels continued on 28 May when Region 365 produced the largest event of the period, an X3/2b at 0027 UTC with an associated Tenflare (1600 SFU), Type II (392 km/s) and Type IV radio sweeps. The intense metric and centimetric bursts associated with this X3 flare included perhaps the largest 245 MHz burst on record – maxing out sensors near 490,000 SFU. Analysis of LASCO imagery indicated that both of these X-class flares produced full halo CMEs. This region also produced eight C-class events on 28 May. Region 365 produced a third X-class event on 29 May - an X1/2b at 0105 UTC. Associated with this event were Type II (1170 km/s) and Type IV radio sweeps, and a halo CME as seen in LASCO imagery. Region 368 (S32, L=152, class/area/mag. Dao/140/B on 29 May) produced two M-class flares on 29 May: an M1/1f at 0218 UTC and an M2/1n at 1937 UTC. The M2 event was associated with a Type II (430 km/s) and Type IV radio sweep. The low activity levels observed on 30 May abruptly ended on 31 May with the onset of another major flare from Region 365. The M9/2b erupted at 31/0224 UTC and was accompanied by a mostly southwest-directed CME. The end of the period (01 June) was marked by the arrival of another considerably active sunspot group – Region 375 (N11, L=023, class/area/mag. Dao/140/B on 01 Jun), which produced three M1 flares on 1 June. Its proximity to the east limb is likely masking this region's true size and complexity.

Solar wind data were available from the NASA Advanced Composition Explorer (ACE) spacecraft for most of the summary period. There was an extended ACE outage late on the 27th through early on the 28th due to a combination of network issues and tracking problems. Solar wind speed began the period in an elevated state due to a high speed coronal hole stream. The already enhanced solar wind speed increased to near 800 km/s on the 28th due to continued high speed stream effects. On 29/1155 UTC, the first of two CMEs associated with the X-class flares from late on the 27th and early on the 28th passed the ACE spacecraft. Sharp increases in solar wind speeds to over 800 km/s were observed and significant increases in solar wind temperature and density were also associated with the passage of these CMEs. The second CME impacted ACE at 29/1830 UTC. IMF Bz turned sharply southward, exceeding  $-30$ nT for a short period, before rotating northward early on the 30<sup>th</sup>. A third CME, likely associated with the X1 flare on 29 May, encountered the ACE spacecraft at about 30/1600 UTC. The speed increase with this transient passage was significant, from just over 500 km/s to almost 900 km/s; however, the IMF structure was weak. A waning transient signature dominated through the 31<sup>st</sup>, before the onset of another high speed stream on 01 June.

There were two greater than 10 MeV proton events at geosynchronous orbit during the summary period. The first began at 28/2335 UTC, reached a 121 PFU peak at 29/1530 UTC, and ended at 30/0110 UTC. This proton event was likely associated with the X-class flares from late on the 27th and early on the 28th. The second proton event was likely associated with the M9 flare on 31 May. The start time for this greater than 10 MeV proton event was 31/0440 UTC; the peak of 27 PFU occurred at 31/0645 UTC, and the event end time was 31/1440 UTC. Greater than 100 MeV enhancements were observed during both of these greater than 10 MeV events, but the 1 PFU threshold was not exceeded.

The greater than 2 MeV electron flux at geosynchronous orbit reached high levels on the 26th and 27th and again on the 29th.

The geomagnetic field ranged from quiet to severe storm levels. The period began with quiet to active levels; the disturbed periods were associated with a diminishing high speed stream. Late on 27 May, a second coronal hole high speed stream increased solar wind velocity to over 750 km/s and produced active to major storm levels with the most active periods occurring early on 28 May during local nighttime hours. On 29 May, the two CME shocks arrived from the X1 and X3 events on 27-28 May. The first shock passed the NASA/ACE spacecraft at 1150 UTC. The second and stronger CME shock passed ACE at 1830 UTC with a 125 km/s increase in solar wind speed to over 800 km/s and Bz deflections that ranged between  $-30$  nT and  $+25$  nT. The geomagnetic response to these transients was severe with G4 ( $K_p=8$ ) storm levels at all latitudes. Storm conditions were waning when a CME shock from the X1 event on 29 May passed ACE at 30/1600 UTC. The high solar wind speed increase with this transient passage was offset by weak IMF structure; consequently, mostly active to minor storm conditions ensued. The period ended with predominantly unsettled to active levels as we transitioned into a large recurrent coronal hole.



## **Space Weather Outlook**

### **04 June - 30 June 2003**

Solar activity is expected to be at low to moderate levels. Moderate levels are possible early in the period from Region 375, which has already produced a number of low M-class events. Active Region 365 maintained its size and complexity as it rotated around the west limb. It will return by mid June and may produce moderate levels. A small chance for a greater than 10 MeV proton event is possible from Region 375 early in the period.

The greater than 2 MeV electron flux is likely to reach high levels on 08 – 16 June and again on 20 – 24 June due to recurring high speed solar wind streams.

The geomagnetic field is expected to range from quiet to active levels with occasional minor to major storm periods. A large recurrent southern coronal hole is currently in a geo-effective position and is expected to produce active to minor storm levels through the 11 June. Recurrent coronal hole high speed streams will likely produce unsettled to active conditions with isolated minor storm levels throughout the latter half of the period (17 – 30 June).



### *Daily Solar Data*

Date	Radio Flux 10.7 cm	Sun spot No.	Sunspot Area (10 <sup>-6</sup> hemi.)	X-ray Background	Flares							
					X-ray Flux			Optical				
					C	M	X	S	1	2	3	4
26 May	125	65	400	B3.5	4	2	0	1	2	0	0	0
27 May	129	116	680	B4.3	3	2	1	4	2	2	0	0
28 May	130	116	1130	B5.9	16	0	1	17	1	0	0	0
29 May	138	98	1150	B3.0	1	2	1	1	2	1	0	0
30 May	117	62	940	B3.3	4	0	0	8	1	0	0	0
31 May	113	57	670	B4.5	4	1	0	4	0	1	0	0
01 June	112	66	720	B6.8	7	5	0	3	0	0	0	0

### *Daily Particle Data*

Date	Proton Fluence (protons/cm <sup>2</sup> -day-sr)			Electron Fluence (electrons/cm <sup>2</sup> -day-sr)		
	>1MeV	>10MeV	>100MeV	>.6MeV	>2MeV	>4MeV
26 May	5.9E+5	1.1E+4	2.7E+3		1.8E+8	
27 May	4.2E+5	1.1E+4	2.6E+3		5.1E+7	
28 May	1.7E+7	2.6E+5	6.0E+3		3.1E+7	
29 May	2.4E+8	2.9E+6	3.2E+3		4.8E+7	
30 May	5.2E+7	2.5E+5	1.8E+3		5.0E+5	
31 May	1.6E+7	8.0E+5	1.8E+4		3.6E+6	
01 June	2.8E+6	6.7E+4	2.2E+3		1.8E+7	

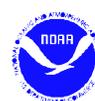
### *Daily Geomagnetic Data*

Date	Middle Latitude Fredericksburg		High Latitude College		Estimated Planetary	
	A	K-indices	A	K-indices	A	K-indices
	26 May	13	4-2-3-2-3-2-2-3	23	5-3-5-4-3-2-2-3	18
27 May	18	3-4-2-3-3-2-4-4	27	4-4-2-5-5-3-4-3	26	4-4-3-3-4-3-4-5
28 May	22	5-4-4-3-3-3-3-3	52	5-5-6-6-5-6-3-3	36	6-5-5-5-4-4-4-4
29 May	59	4-3-3-2-5-6-7-7	127	4-4-6-6-8-8-8-6	89	5-4-4-3-6-7-8-8
30 May	36	7-4-3-2-3-4-4-4	41	7-4-3-4-4-5-3-4	49	8-4-4-3-4-5-4-5
31 May	18	5-5-2-1-2-2-3-2	18	4-5-3-2-4-2-2-2	17	5-5-3-1-3-3-2-2
01 June	18	2-4-3-2-3-3-4-4	21	3-4-4-3-4-3-4-3	19	3-3-3-2-3-3-4-4



### *Alerts and Warnings Issued*

<u>Date &amp; Time of Issue</u>	<u>Type of Alert or Warning</u>	<u>Date &amp; Time of Event UT</u>
26 May 0502	ALERT: Electron 2MeV Integral Flux > 1000pfu	26 May 0500
26 May 1455	EXT WARNING: Geomagnetic K = 4	25 May 1658 -26 May 1500
26 May 2131	EXT WARNING: Geomagnetic K = 4	25 May 1658 -27 May 1500
27 May 0036	WARNING: Geomagnetic K = 5	27 May 0040 - 1500
27 May 0641	SUMMARY: 10cm Radio Burst	27 May 0603
27 May 1330	ALERT: Electron 2MeV Integral Flux > 1000pfu	27 May 1310
27 May 1446	EXT WARNING: Geomagnetic K = 4	25 May 1658 - 28 May 1500
27 May 2303	ALERT: X-Ray Flux exceeded M5	27 May 2303
27 May 2318	SUMMARY: X-ray Event exceeded X1	27 May 2256
27 May 2325	ALERT: Type II Radio Emission	27 May 2311
27 May 2330	WARNING: Proton 10MeV Integral Flux > 10pfu	27 May 2350 - 28 May 0100
27 May 2339	ALERT: Type IV Radio Emission	27 May 2311
27 May 2350	ALERT: Geomagnetic K = 5	27 May 2350
27 May 2356	WARNING: Geomagnetic K = 5	27 May 2357 - 28 May 1500
28 May 0000	SUMMARY: 10cm Radio Burst	27 May 2259
28 May 0023	ALERT: X-Ray Flux > M5	28 May 0022
28 May 0042	SUMMARY: X-ray Event > X1	28 May 0017
28 May 0049	ALERT: Type II Radio Emission	28 May 0026
28 May 0053	ALERT: Type IV Radio Emission	28 May 0050
28 May 0210	SUMMARY: 10cm Radio Burst	28 May 0020
28 May 0233	WARNING: Proton 10MeV Integral Flux > 10pfu	28 May 0400 - 1700
28 May 0257	ALERT: Geomagnetic K = 6	28 May 0257
28 May 1443	EXT WARNING: Geomagnetic K = 5	27 May 2357 - 28 May 2359
28 May 1656	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	28 May 0400 - 2359
28 May 2317	WARNING: Geomagnetic K = 5	28 May 2320 - 29 May 1500
28 May 2327	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	28 May 0400 - 29 May 1500
28 May 2333	WATCH: Geomagnetic A $\geq$ 20	29 May
28 May 2335	WATCH: Geomagnetic A $\geq$ 30	30 May
28 May 2350	ALERT: Proton Event 10MeV Integral Flux > 10pfu	28 May 2335
29 May 0102	ALERT: X-Ray Flux > M5	29 May 0102
29 May 0117	SUMMARY: X-ray Event > X1	29 May 0051
29 May 0123	ALERT: Type II Radio Emission	29 May 0106
29 May 0126	ALERT: Type IV Radio Emission	29 May 0058
29 May 0219	ALERT: Geomagnetic K=5	29 May 0218
29 May 0244	SUMMARY: 10cm Radio Burst	29 May 0058
29 May 1216	ALERT: Electron 2MeV Integral Flux > 1000pfu	29 May 1150
29 May 1453	EXTENDED WARNING: Geomagnetic K= 5	28 May 2320 - 30 May 1500
29 May 1538	ALERT: Proton Event 10MeV Integral Flux > 100pfu	29 May 1525
29 May 1545	WARNING: Geomagnetic K= 6	29 May 1545 - 2359
29 May 1635	ALERT: Geomagnetic K= 6	29 May 1633
29 May 1840	WARNING: Geomagnetic K 7	29 May 1840 - 30 May 1500
29 May 1904	ALERT: Geomagnetic K= 6	29 May 1902
29 May 1913	ALERT: Geomagnetic K= 7	29 May 1909
29 May 1945	ALERT: Type IV Radio Emission	29 May 1914
29 May 1947	SUMMARY: 10cm Radio Burst	29 May 1931
29 May 2015	ALERT: Type II Radio Emission	29 May 1919
29 May 2019	ALERT: Geomagnetic K= 8	29 May 2013
29 May 2029	WATCH: Geomagnetic A $\geq$ 50	30 May
29 May 2031	WATCH: Geomagnetic A $\geq$ 20	31 May
29 May 2142	ALERT: Geomagnetic K= 6	29 May 2139
29 May 2214	ALERT: Geomagnetic K= 7	29 May 2211

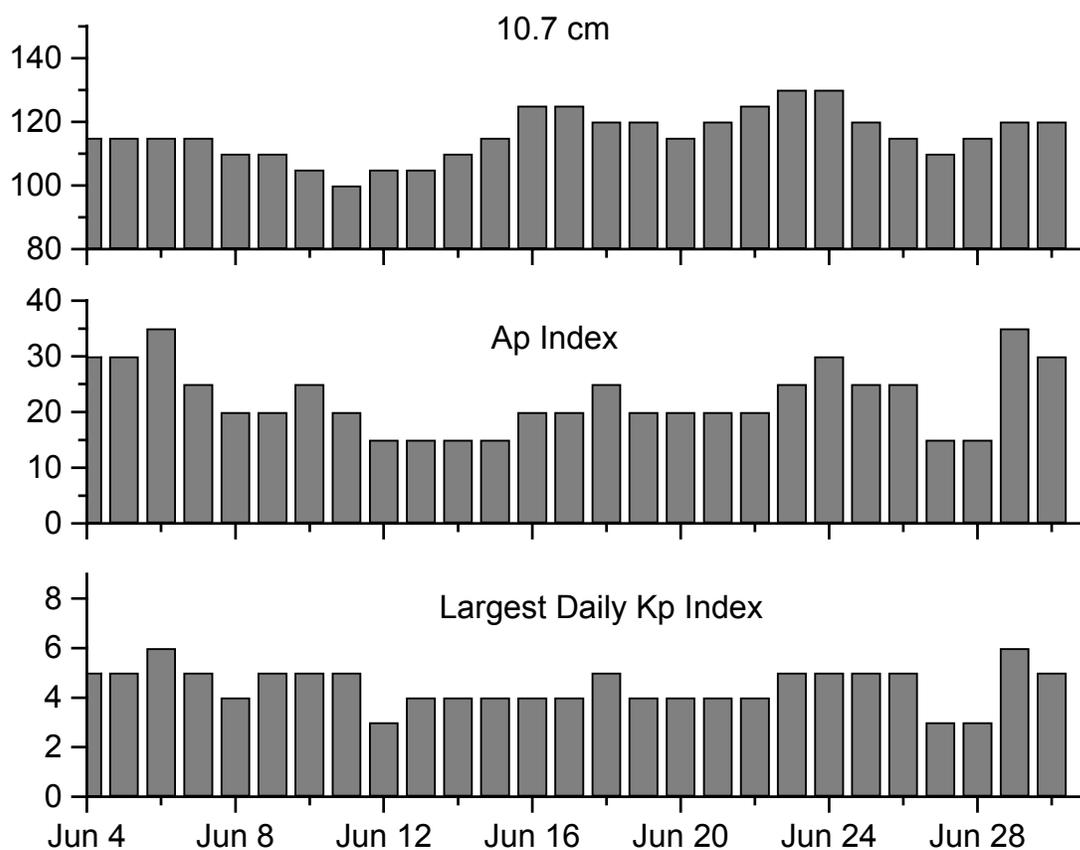


*Alerts and Warnings Issued - continued.*

Date & Time of Issue	Type of Alert or Warning	Date & Time of Event UT
30 May 0022	2 - 245 MHz Bursts	29 May
30 May 0140	ALERT: Geomagnetic K= 6	30 May 0139
30 May 0155	ALERT: Geomagnetic K= 7	30 May 0152
30 May 1106	SUMMARY: Proton Event 10MeV Integral Flux > 100pfu	29 May 1525
30 May 1440	SUMMARY: Proton Event 10MeV Integral Flux > 10pfu	28 May 2335
30 May 1522	WARNING: Geomagnetic K= 4	30 May 1522 -31 May 1500
30 May 1525	ALERT: Geomagnetic K= 4	30 May 1522
30 May 1620	WARNING: Geomagnetic Sudden Impulse	30 May 1630 - 1700
30 May 1650	ALERT: Geomagnetic K= 5	30 May 1644
30 May 1651	WARNING: Geomagnetic K= 5	30 May 1651 - 2359
31 May 0222	ALERT: X-Ray Flux exceeded M5	31 May 0221
31 May 0314	SUMMARY: X-ray Event exceeded M5	31 May 0224
31 May 0316	ALERT: Type II Radio Emission	31 May 0223
31 May 0345	SUMMARY: 10cm Radio Burst	31 May 0217
31 May 0426	ALERT: Geomagnetic K= 5	31 May 0424
31 May 0432	ALERT: Geomagnetic K-index of 6	31 May 0431
31 May 0445	WARNING: Geomagnetic K= 6	31 May 0445 -1500
31 May 0457	ALERT: Proton Event 10MeV Integral Flux > 10pfu	31 May 0440
31 May 0526	WARNING: Proton 10MeV Integral Flux > 10pfu	31 May 0526 - 1500
31 May 1404	EXT WARNING: Proton 10MeV Integral Flux > 10pfu	31 May 0526 -1800
31 May 1746	SUMMARY: Proton Event 10MeV Integral Flux > 10pfu	31 May 0440
31 May 2134	WATCH: Geomagnetic A-index of 20 or greater predicted	03 Jun
01 Jun 0400	WARNING: Geomagnetic K= 4	01 Jun 0400 -1500
01 Jun 0415	ALERT: Geomagnetic K= 4	01 Jun 0414
01 Jun 1937	WARNING: Geomagnetic K= 5	01 Jun 1938 -2359
01 Jun 1941	ALERT: Geomagnetic K= 4	01 Jun 1939
01 Jun 2111	WATCH: Geomagnetic A $\geq$ 20	04 Jun



### Twenty-seven Day Outlook



Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index	Date	Radio Flux 10.7 cm	Planetary A Index	Largest Kp Index
04 Jun	115	30	5	18 Jun	120	25	5
05 Jun	115	30	5	19 Jun	120	20	4
06 Jun	115	35	6	20 Jun	115	20	4
07 Jun	115	25	5	21 Jun	120	20	4
08 Jun	110	20	4	22 Jun	125	20	4
09 Jun	110	20	5	23 Jun	130	25	5
10 Jun	105	25	5	24 Jun	130	30	5
11 Jun	100	20	5	25 Jun	120	25	5
12 Jun	105	15	3	26 Jun	115	25	5
13 Jun	105	15	4	27 Jun	110	15	3
14 Jun	110	15	4	28 Jun	115	15	3
15 Jun	115	15	4	29 Jun	120	35	6
16 Jun	125	20	4	30 Jun	120	30	5
17 Jun	125	20	4				



### Energetic Events

Date	Time		½ Max	X-ray		Optical Information			Peak		Sweep Freq	
	Begin	Max		Class	Flux	Imp/ Brtns	Location		Rgn #	Radio Flux		Intensity
			Lat				CMD	245		2695	II	IV
26 May	0534	0550	0602	M1.9	.019	1f	S09E12	365		91		1
26 May	1622	1637	1651	M1.0	.012			365		160	56	
27 May	0240	0306	0321	M1.4	.019	1f	S07W03	365		730	98	
27 May	0506	0626	0716	M1.6	.061	1f	S07W14	365		200	150	
27 May	2256	2307	2313	X1.3	.071	2b	S07W17	365		2800	910	3 2
28 May	0017	0027	0039	X3.6	.280					490000	1600	3 3
29 May	0051	0105	0112	X1.2	.068	2b	S06W37	365		25000	730	3 1
29 May	0209	0218	0224	M1.5	.009	1f	S37E03	368				1
29 May	1928	1937	1943	M2.8	.014	1n	S35W13	368		830	310	3
31 May	0213	0224	0240	M9.3	.085	2b	S07W65	365		21000	1300	3
01 Jun 03	0223	0306	0400	M1.4	.061			375		56	67	
01 Jun 03	0701	0711	0722	M1.0	.008			375				
01 Jun 03	1239	1250	1256	M1.0	.005			375				
01 Jun 03	1643	1652	1659	M1.4	.008	Sf	S08W80	365				
01 Jun 03	2058	2105	2110	M1.0	.004			160				

### Flare List

Date	Time			X-ray Class.	Imp / Brtns	Optical Location Lat CMD	Rgn
	Begin	Max	End				
26 May	0357	0401	0406	B3.5			
	0547	0552	0637	M1.9	1f	S09E12	365
	1124	1128	1131	C1.0			
	1451	1454	1457	B4.8			
	1503	1520	1539	C5.9			
	1622	1637	1651	M1.0			365
	B1734	1739	1744	C7.4	1f	S05W08	365
	2240	2246	2253	C1.5			
	2359	0000	0002		Sf	S06W08	365
27 May	0117	0122	0125	C1.7			
	0243	0259	0327	M1.4	1f	S07W03	365
	0340	0341	0412	C8.9	Sf	S07W13	365
	0539	0617	0750	M1.6	1f	S07W14	365
	1454	1517	1548	C6.5	Sf	S06W12	365
	2258	0031	A0144	X1.3	2b	S07W17	365
	2303	2304	2320		Sf	S12W10	371
	B2345	0024	0645		2b	S06W24	365
	2350	2351	2356		Sf	S32E06	365
28 May	0017	0027	0039	X3.6			
	0443	0447	0451	C7.6			
	0605	0609	0614	C3.1			
	0944	0946	1003	C1.9	Sf	S05W24	365
	1028	1029	1032		Sf	S04W25	365
	1124	1128	1134	B9.1			
	1216	1221	1224	C1.3			
	1236	1237	1243	C1.3	Sf	S04W27	365



*Flare List - continued.*

Date	Time			X-ray Class.	Optical		Rgn	
	Begin	Max	End		Imp / Brtns	Location Lat CMD		
28 May	1319	1320	1326		Sf	S02W26	365	
	1334	1424	1446		Sf	S01W26	365	
	1350	1355	1412	C1.3				
	1423	1423	1427	C2.2	Sf	S05W27	365	
	1448	1547	1629	C1.5	Sf	S01W27	365	
	1544	1545	1550	C3.5	Sf	S05W29	365	
	1636	1639	1645		Sf	S07W33	365	
	1722	1845	2001	C3.5	1f	N00W28	365	
	1800	1808	1815	C2.0				
	1841	1844	1846	C4.4				
	1934	1939	1942	C1.9				
	2008	2015	2038	C3.1	Sf	S07W35	365	
	2030	2030	2036		Sf	S28E00	368	
	2042	2050	2059		Sf	N00W29	365	
	2052	2057	2108		Sf	N11E73	373	
	2102	2131	2135		Sf	S01W28	365	
	2109	2111	2117		Sf	N07E58	373	
	2118	2119	2124		Sf	N07E58	373	
	2205	2206	2211	C1.6	Sf	S07W36	365	
	2302	2305	2310	C1.0				
	29 May	0020	0022	0030	B7.9	Sf	S07W37	365
		0035	0105	0223	X1.2	2b	S06W37	365
		0210	0217	0239	M1.5	1f	S37E03	368
0513		0519	0525	C1.2				
0830		0833	0835	B5.8				
1045	1049	1056	B7.9					
1932	1939	2007	M2.8	1n	S35W13	368		
30 May	0045	0046	0057	B5.3	Sf	S36W17	368	
	0128	0130	0138	B6.0	Sf	S06W51	365	
	0327	0327	0343	B8.6	Sf	S07W55	365	
	0552	0552	0606	C1.0	Sf	S05W54	365	
	0642	0650	0715	C8.6	1n	S05W55	365	
	0852	0858	0000	C4.9	Sf	N08E55	373	
	1401	1412	1422	B7.1				
	1450	1452	1458		Sf	S07W59	365	
1719	1726	1748	C1.7	Sf	S02W54	365		
1931	1931	1934		Sf	S02W54	365		
31 May	0024	0027	0041	C3.5	Sf	N07E30	373	
	0218	0223	0338	M9.3	2b	S07W65	365	
	1407	1408	1424	C1.3	Sf	S05W72	365	
	1529	1529	1540	C3.5	Sf	S07W73	365	
	1620	1632	1640	C6.2				



**Flare List - continued.**

Date	Time			X-ray Class.	Optical		Rgn
	Begin	Max	End		Imp / Brtns	Location Lat CMD	
31 May	2215	2218	2222	B8.6			
	2321	2323	2326		Sf	S03W73	365
01 June	0048	0052	0109	C3.7	Sf	S34W40	368
	0223	0306	0400	M1.4			375
	0701	0711	0722	M1.0			375
	0746	0749	0751	C4.6			
	0857	0903	0910	C5.0			
	1239	1250	1256	M1.0			375
	1345	1349	1351		Sf	N09E90	375
	1558	1602	1625	B9.1			
	1658	1658	1704	M1.4	Sf	S08W80	365
	1838	1841	1845	C1.2			
	1927	1937	1943	C1.7			
	2026	2033	2037	C2.0			
	2058	2105	2110	M1.0			
	2323	2337	2348	C9.1			

**Region Summary**

Date	Location		Sunspot Characteristics				Flares										
	(° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical						
		Lon						C	M	X	S	1	2	3	4		
<i>Region 362</i>																	
15 May	S10E77	244	0070	10	Dao	003	B										
16 May	S11E64	244	0240	10	Dao	011	B										
17 May	S11E50	245	0210	10	Dao	010	B										
18 May	S11E37	245	0110	08	Dso	010	Bg										
19 May	S11E23	245	0070	09	Cao	008	B										
20 May	S10E10	245	0090	08	Dso	011	Bg	1				1					
21 May	S12W03	245	0110	08	Dao	019	Bg	1									
22 May	S11W15	244	0100	08	Dso	015	B	4				2					
23 May	S11W30	246	0050	07	Dao	007	B					1					
24 May	S10W44	246	0030	07	Cro	004	B										
25 May	S10W57	246															
26 May	S10W70	246															
27 May	S10W83	246															
28 May	S10W96	246															
								6	0	0	4	0	0	0	0	0	0

Crossed West Limb.

Absolute heliographic longitude: 245



**Region Summary - continued.**

Date	Location		Sunspot Characteristics				Flares											
	( ° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical							
		Lon						C	M	X	S	1	2	3	4			
<i>Region 365</i>																		
20 May	S06E68	187	0130	04	Dso	004	B											
21 May	S07E52	190	0080	03	Dao	004	B											
22 May	S07E38	191	0040	03	Cso	004	B											
23 May	S09E25	191	0020	01	Hsx	001	A											
24 May	S08E11	191	0020	03	Bxo	005	B											
25 May	S08E08	181	0190	06	Dai	016	B						1					
26 May	S06W06	182	0210	07	Dai	018	B	1	2			1	2					
27 May	S07W19	182	0400	07	Dkc	038	Bgd	2	2	1	3	2	2					
28 May	S07W32	182	0840	08	Dkc	040	Bgd	8				13	1					
29 May	S07W45	182	0880	08	Dkc	032	Bgd				1	1		1				
30 May	S07W59	182	0800	08	Dkc	025	Bgd	3				6	1					
31 May	S07W72	182	0540	08	Dkc	022	Bgd	2	1			3		1				
01 Jun	S07W84	181	0450	08	Dkc	015	Bgd		1			1						
								16	6	2	29	6	4	0	0			

Still on Disk.

Absolute heliographic longitude: 182

*Region 366*

22 May	N11E62	167	0020	01	Axx	002	A											
23 May	N10E50	166	0020	03	Bxo	002	B											
24 May	N11E36	166	0010	01	Axx	001	A											
25 May	N11E23	166											1					
26 May	N11E10	166																
27 May	N11W03	166																
28 May	N11W16	166																
								0	0	0	1	0	0	0	0	0		

Still on Disk.

Absolute heliographic longitude: 166



**Region Summary - continued.**

Date	Location		Sunspot Characteristics				Flares							
	( ° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
		Lon						C	M	X	S	1	2	3

*Region 367*

22 May	S14E69	160	0050	02	Cao	001	B											
23 May	S14E55	161	0030	01	Hsx	001	A											
24 May	S14E42	160	0070	02	Hsx	001	A											
25 May	S14E29	160	0040	04	Cso	004	B					1						
26 May	S14E17	159	0050	03	Cao	003	B											
27 May	S14E04	159	0030	03	Cao	004	B											
28 May	S14W09	159	0020	03	Cso	004	B											
29 May	S14W22	159	0010	01	Hsx	001	A											
30 May	S13W35	159																
31 May	S13W48	159																
01 Jun	S13W61	159																

0 0 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 159

*Region 368*

22 May	S32E76	153	0180	02	Hax	001	A											
23 May	S32E62	154	0170	03	Hax	001	A											
24 May	S33E50	152	0170	02	Hsx	001	A											
25 May	S33E37	152	0130	02	Hax	001	A	1				2						
26 May	S32E24	152	0120	03	Hax	001	A											
27 May	S32E11	152	0100	05	Cso	008	B											
28 May	S32W02	152	0120	05	Cso	006	B					1						
29 May	S32W15	152	0140	06	Dao	011	B		2				2					
30 May	S32W26	149	0060	04	Dao	006	B						1					
31 May	S33W38	148	0020	03	Cro	004	B											
01 Jun	S33W51	148	0010	01	Axx	002	A	1					1					

2 2 0 5 2 0 0 0

Still on Disk.

Absolute heliographic longitude: 152

*Region 369*

23 May	N12E08	208	0020	03	Cao	004	B											
24 May	N12W08	210	0010	01	Axx	001	A											
25 May	N12W21	210																
26 May	N12W34	210																
27 May	N12W47	210																
28 May	N12W60	210																

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 208



**Region Summary - continued.**

Date	Location		Sunspot Characteristics				Flares							
	° Lat	° CMD	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
								C	M	X	S	1	2	3

*Region 370*

23 May	N16E53	163	0020	01	Axx	001	A												
24 May	N16E38	164	0010	01	Axx	001	A												
25 May	N16E25	164										1							
26 May	N16E13	163	0020	02	Cro	003	B												
27 May	N16E00	163																	
28 May	N16W13	163																	
29 May	N16W26	163																	
30 May	N16W39	163																	
												0	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 163

*Region 371*

27 May	S13W10	173	0010	00	Hsx	001	A					1							
28 May	S13W23	173																	
29 May	S13W36	173																	
30 May	S13W49	173																	
												0	0	0	1	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 173

*Region 372*

27 May	S14W03	166	0020	02	Bxo	004	B												
28 May	S14W16	166	0010	04	Bxo	003	B												
29 May	S14W29	166																	
30 May	S14W42	166																	
												0	0	0	0	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 166

*Region 373*

27 May	N08E81	082	0120	02	Hax	001	A												
28 May	N08E66	082	0130	02	Hsx	002	A					3							
29 May	N08E53	084	0110	04	Cso	003	B												
30 May	N08E41	082	0080	02	Hsx	001	A	1				1							
31 May	N08E28	082	0110	02	Hsx	001	A	1				1							
01 Jun	N07E15	082	0120	04	Cso	007	B												
												2	0	0	5	0	0	0	0

Still on Disk.

Absolute heliographic longitude: 082



***Region Summary - continued.***

Date	Location		Sunspot Characteristics					Flares						
	( ° Lat ° CMD)	Helio	Area (10 <sup>-6</sup> hemi)	Extent (helio)	Spot Class	Spot Count	Mag Class	X-ray			Optical			
		Lon						C	M	X	S	1	2	3

*Region 374*

28 May	S22W59	209	0010	01	Axx	001	A										
29 May	S22W72	209	0010	01	Axx	001	A										
30 May	S23W85	209															

0 0 0 0 0 0 0 0

Crossed West Limb.

Absolute heliographic longitude: 209

*Region 375*

01 Jun	N11E74	023	0140	10	Dao	002	B										
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3 1  
0 3 0 1 0 0 0 0

Still on Disk.

Absolute heliographic longitude: 023

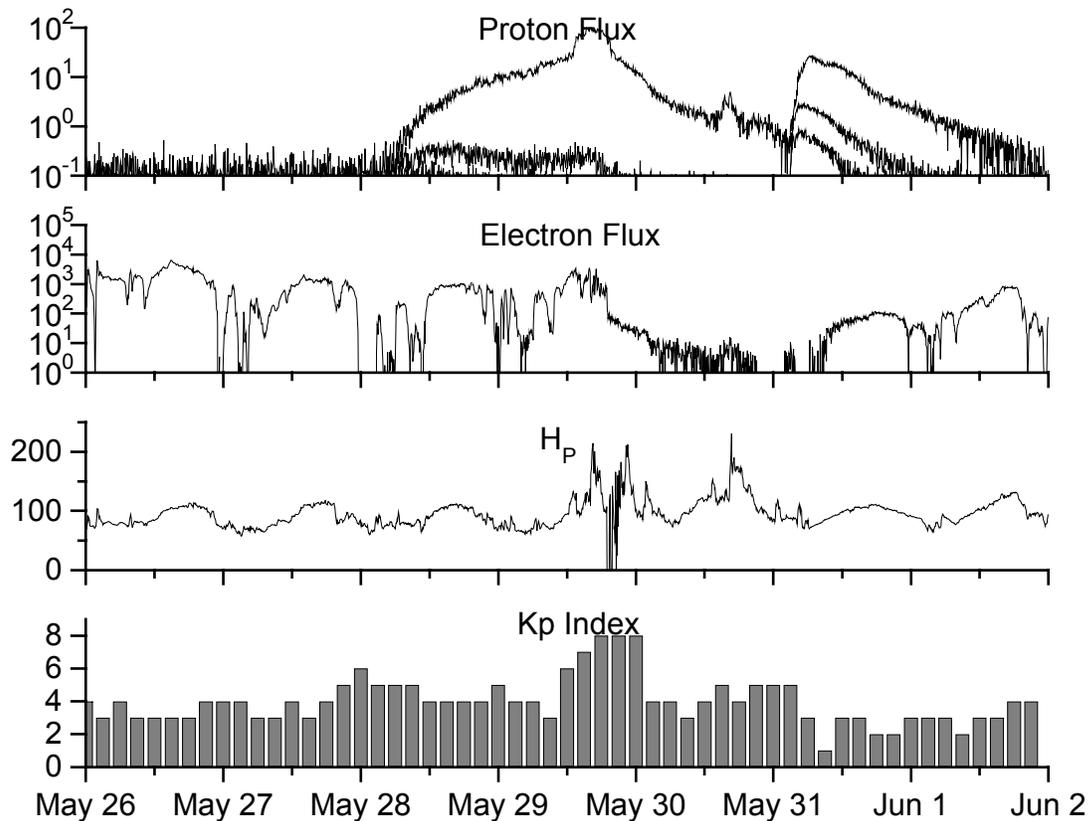


**Recent Solar Indices (preliminary)  
of the observed monthly mean values**

Month	Sunspot Numbers			Radio Flux		Geomagnetic			
	Observed values SWO	Ratio RI	Ratio RI/SWO	Smooth values SWO	Smooth values RI	*Penticton 10.7 cm	Smooth Value	Planetary Ap	Smooth Value
<b>2001</b>									
May	135.1	97.3	0.72	163.1	108.8	147.9	174.8	12	12.5
June	196.7	134.0	0.68	167.2	109.9	173.7	178.8	12	12.4
July	124.6	82.2	0.66	172.1	111.8	131.3	183.9	11	12.4
August	159.4	106.8	0.67	176.7	113.8	163.1	188.8	13	12.5
September	229.1	150.7	0.66	178.8	114.3	233.8	191.3	13	12.8
October	197.4	125.6	0.64	179.5	114.1	208.1	191.9	20	12.0
November	178.6	106.5	0.60	183.7	115.6	212.7	193.7	16	12.0
December	217.5	132.2	0.61	184.5	114.6	235.6	193.9	09	12.2
<b>2002</b>									
January	189.0	114.1	0.60	184.8	113.5	227.3	194.6	08	12.4
February	194.5	107.4	0.55	188.6	114.7	205.0	197.2	10	12.8
March	153.1	98.4	0.64	188.9	113.4	180.3	195.7	10	13.0
April	194.9	120.7	0.62	186.2	110.5	189.8	191.5	15	13.2
May	204.1	120.8	0.59	183.6	108.9	178.4	188.0	15	13.3
June	146.0	88.3	0.60	179.9	106.3	148.7	183.0	11	13.5
July	183.5	99.9	0.54	175.4	102.7	173.5	173.5	13	13.9
August	191.0	116.4	0.61	169.3	98.7	183.9	169.5	16	14.3
September	206.4	109.6	0.53	163.4	94.6	175.8	164.2	14	14.9
October	153.9	97.5	0.63	158.7	90.5	167.0	159.5	23	15.5
November	159.8	95.5	0.60			168.7		16	
December	147.9	80.8	0.55			158.6		13	
<b>2003</b>									
January	149.3	79.5	0.53			144.6		13	
February	87.9	46.2	0.53			124.6		15	
March	119.7	61.5	0.51			132.3		19	
April	114.3	60.0	0.52			126.5		20	

**NOTE:** All smoothed values after June 1999 and monthly values after December 2000 are preliminary estimates. The lowest smoothed sunspot index number for Cycle 22, RI = 8.0, occurred in May 1996. The highest smoothed sunspot number for Cycle 22, RI = 158.5, occurred July 1989. \*After June 1991, the 10.7 cm radio flux data source is Penticton, B.C. Canada. Prior to that, it was Ottawa.





*Weekly Geosynchronous Satellite Environment Summary*

*Week Beginning 26 May 2003*

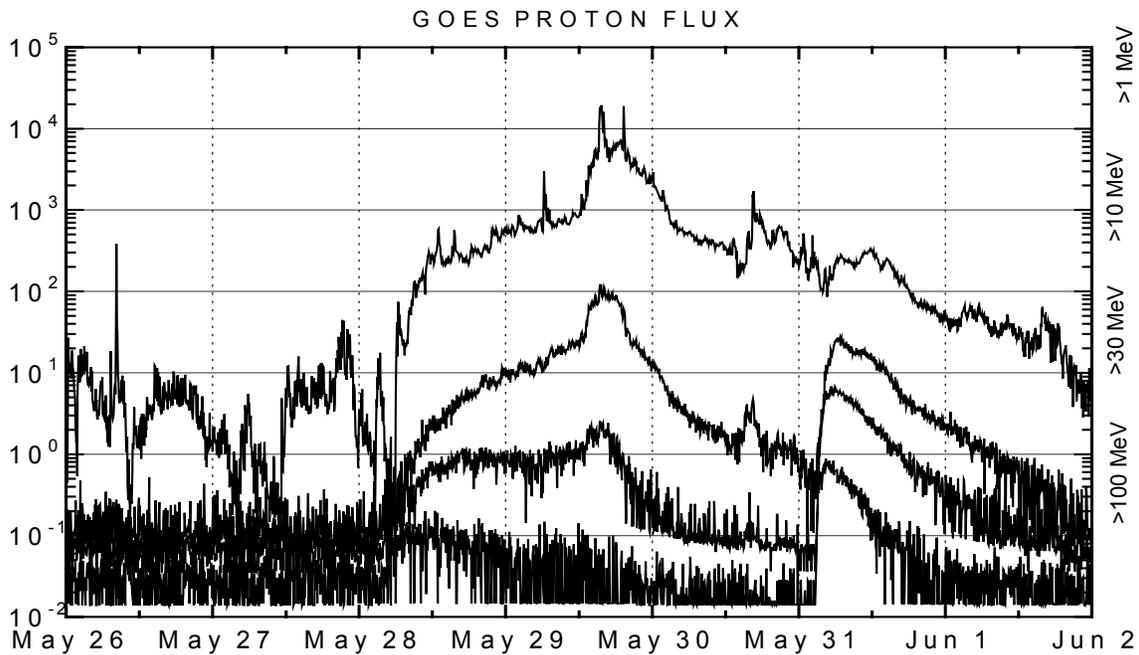
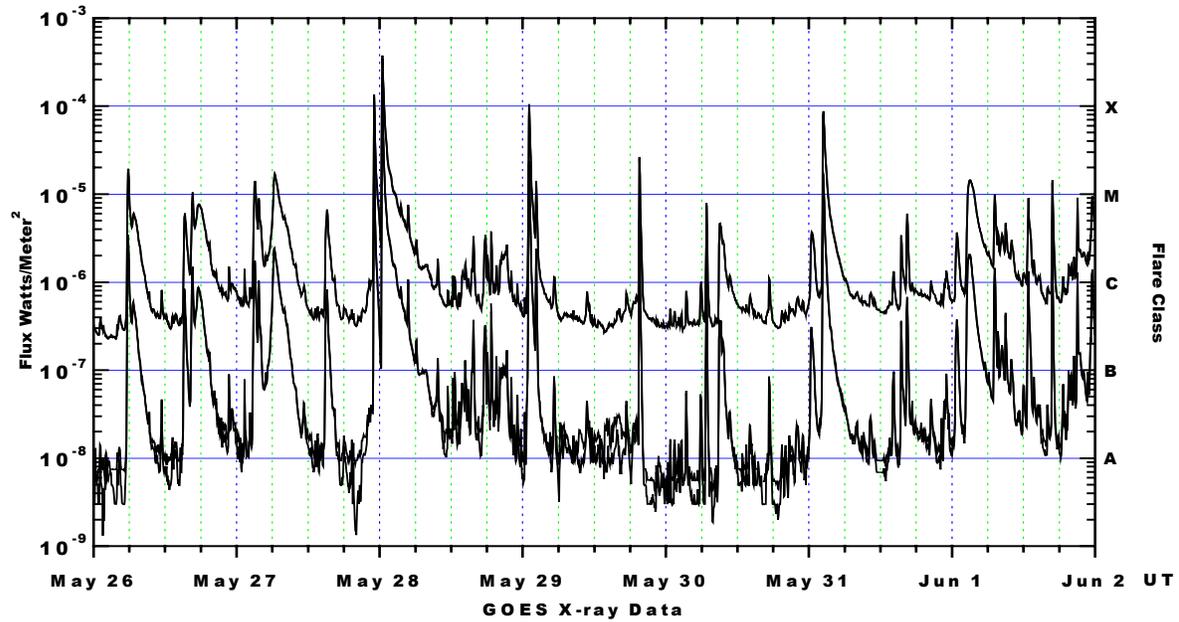
*Protons* plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75) for each of three energy thresholds: greater than 10, 50, and 100 MeV.

*Electrons* plot contains the five-minute averaged integral electron flux (electrons/cm<sup>2</sup>-sec-sr) with energies greater than 2 MeV at GOES-12.

*H<sub>p</sub>* plot contains the five minute averaged magnetic field H - component in nanoteslas (nT) as measured by GOES-12. The H component is parallel to the spin axis of the satellite, which is nearly parallel to the Earth's rotation axis.

*K<sub>p</sub>* plot contains the estimated planetary 3-hour K-index (derived by the Air Force Weather Agency) in real time from magnetometers at Meanook, Canada; Sitka, AK; Glenlea, Canada; St. Johns, Canada; Ottawa, Canada; Newport, WA; Fredericksburg, VA; Boulder, CO; Fresno, CA and Heartland, UK. These data are made available through cooperation from the Geological Survey of Canada (GSC) and the US Geological Survey. These may differ from the final K<sub>p</sub> values derived from a more extensive network of magnetometers. The data included here are those now available in real time at the SWO and are incomplete in that they do not include the full set of parameters and energy ranges known to cause satellite operating anomalies. The proton and electron fluxes and K<sub>p</sub> are "global" parameters that are applicable to a first order approximation over large areas. H<sub>p</sub> is subject to more localized phenomena and the measurements generally are applicable to within a few degrees of longitude of the measuring satellite.





*Weekly GOES Satellite X-ray and Proton Plots*

X-ray plot contains five-minute averaged x-ray flux (watts/m<sup>2</sup>) as measured by GOES 12 and 10 in two wavelength bands, .05 - .4 and .1 - .8 nm. The letters A, B, C, M and X refer to x-ray event levels for the .1 - .8 nm band.

Proton plot contains the five-minute averaged integral proton flux (protons/cm<sup>2</sup>-sec-sr) as measured by GOES-8 (W75) for each of the energy thresholds: >1, >10, >30 and >100 MeV. P10 event threshold is 10 pfu (protons/cm<sup>2</sup>-sec-sr) at greater than 10 MeV.

